



United States
Department of
Agriculture

Forest
Service

Southwestern Region
Forest Health
Arizona Zone Office

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File Code: 3420

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Mr. Joseph Alston
Park Superintendent
Grand Canyon National Park
P.O. Box 129
Grand Canyon, AZ 86023

Dear Mr. Alston:

Tanya Holigay, IPM Coordinator for the Grand Canyon National Park, requested that Forest Health specialists with the Arizona Zone Forest Health Protection (FHP) office, USDA Forest Service, assess the southern portion of the Park for forest insect and disease activity. On September 10, 2002, Mary Lou Fairweather, Plant Pathologist, and myself met with Tanya and visited several sites in and around established trails, overlooks, parking areas and structures. The objective of the site visit was to determine the level of bark beetle activity in these developed sites, discuss future beetle population trends, and provide management options for reducing the potential threat of bark beetle-related mortality to ponderosa and pinyon pine.

Bark Beetle activity in Arizona and the Grand Canyon National Park

A significant increase in bark beetle-killed ponderosa and pinyon pine has been documented across the state and throughout the Southwest during 2002. Within many of these areas, pine mortality is already greater than 25% for a given stand and as high as 90% in others. Drought is the primary catalyst behind this mortality.

High tree densities have also increased the susceptibility of pines to bark beetle attacks. Most of the mortality is occurring on dryer sites with thinner soils and in vegetation transition zones. Ground surveys indicate that there are *Ips* and *Dendroctonus* beetle species causing the majority of the mortality. These are native bark beetles in southwestern forest ecosystems.

During our site visit to the south rim of the Grand Canyon National Park, we saw few signs of beetle-related pine mortality in and around the Park headquarters and visitors center. We traveled east on Route 64, stopping at a number of picnic and overlook sites, and observed only scattered pine mortality. An aerial survey of the south rim was requested at that time to obtain a landscape perspective of forest health conditions.

The requested aerial detection survey was conducted November 11th on the south rim of the Park, and outbreak levels of bark beetle activity were detected. There were also visual signs of drought stress in much of the ponderosa and pinyon pine. Bark beetle-killed pine is scattered throughout the south rim, with heavier levels of ponderosa pine mortality occurring south of Route 64 from the Grandview Point turn-off east for approximately four to five miles. An earlier aerial survey of the north rim was conducted in August, and very little pine mortality was



detected. Data and maps from the aerial detection surveys are being processed and will be made available to the Park later this winter.

Past bark beetle outbreaks have been closely tied to drought patterns. If below-average precipitation levels occur this winter, beetle population levels and tree mortality are expected to increase. There are currently very large numbers of beetles overwintering, and they are expected to emerge in early spring. This population is expected to cause additional pine mortality regardless of precipitation patterns. However, above-average moisture this winter will help boost the tree's defense system, its ability to pitch-out attacking beetles, and reduce the number of successfully attacked trees this coming summer.

Prevention and control alternatives for bark beetles

Management of bark beetle populations falls under two categories: direct action against the beetles themselves (control) or indirect action that addresses the general stand conditions (prevention). Preventive strategies are most effective in reducing tree losses over the long term. Losses can be avoided or minimized in most cases by promoting and maintaining healthy forest and tree conditions. The following are management alternatives available for consideration:

Silvicultural treatments. These are forest management actions that increase tree vigor and reduce stand susceptibility to beetle attack through reducing tree densities. Thinning dense stands of ponderosa and pinyon pine relieves competitive stress among the remaining trees, making them less susceptible to attack. Careful slash management is necessary while beetle populations are high. Burning, chipping or burying green slash material will help to reduce the potential for additional beetle caused mortality. Fresh pine chips can attract beetles and should be removed from areas to avoid attacks in residual pines.

Sanitation removal. Sanitation removal involves removing currently infested pines prior to the beetle maturation and emergence. It requires the removal of trees that have live brood in them. These trees may have green needles or have started fading to a pale green, orange or red. Infested trees that have been removed need to be treated; either moved to at least one mile from the nearest live host type, burned, peeled or chipped. When burning infested trees or slash, the material does not need to be entirely consumed; only the outer bark and cambium needs to be charred significantly enough to kill the brood. This treatment option is most effective when beetle populations are at low or building levels.

Protection of high value trees. Uninfested valuable pines at recreation sites, trail heads, administrative sites, etc. may be sprayed with carbaryl (Sevin product) to prevent successful beetle attack. Both the trunk and large branches (>3 inches diameter) should be sprayed. Because pine engraver beetles generally initiate attacks near the top of the bole in ponderosa pine, it is important that the spray reach this area. Attacking beetles die as they attempt to chew through the bark. Preventive sprays are not recommended for trees already attacked.

Recommendations

Because the current beetle infestation is occurring on a landscape scale and is largely a result of the ongoing drought, it is impossible to control the beetle populations as a whole through management actions. Therefore, control actions should be limited to the most critical, high-value areas that have adequate accessibility.

Based on current drought conditions, tree densities and bark beetle populations I would recommend an integrated pest management approach be taken to minimize future tree losses. Areas of concern should be monitored for beetle activity and currently infested trees be removed by early spring (i.e., by April 1st) before the brood completes their development and adult beetles emerge. If infested trees are cut, they must either be removed from the site, or the bark should be burned or stripped off to kill the developing beetle brood or the trees chipped.

During our site visit there were no areas that would warrant preventive sprays at this time. If beetle populations continue to increase this coming summer and additional tree mortality occurs within high value sites preventive treatments can be used to minimize future tree losses.

If you have any questions regarding my assessment of current bark beetle activities within the Park, its potential effect on residual standing trees, or my recommendations, please let me know. We are also available for further evaluations, presentations of this topic to your leadership team or training for individuals to identify and manage for forest insects and diseases.

Sincerely,

/s/ John Anhold
JOHN ANHOLD
Arizona Zone Leader
Forest Health

cc: MaryLou Fairweather, Joel McMillin, Bobbe Fitzgibbon, Debra Allen-Reid, Leonard Lucero Dimica Vigil, GCNP; Tanya Holigay, GCNP